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Interactions between internal migration and other biographic events

The modelling of the initial distribution of sojourn times

1 Introduction

The interactions between migration and other biographic events are analysed in this paper. Former investigations assumed a strong interaction between removals over longer distance and educational or job changes. Interactions with private changes as marriages, consensual unions or dissolutions of partnerships were neglected.

In the methodological part of the paper it is proposed to model the sojourn times to make a distinction between changes of variables which might be conjunct with the migration respectively which are part of the initial distribution of event history.

1.1 Migration today

Migrations in this investigation are migrations between the German Länder, for instance between Berlin and Bavaria or between Berlin and a community in Brandenburg which might be a neighbour to Berlin. In general they can be regarded as internal migrations over a longer distance to an area with some differences of the culture, the political system and settlement type.

"The development of internal migration behaviour in the Federal Republic of Germany after the Second World War is characterized primarily by a long-term decrease of spatial mobility ... The number of the internal migrations was reduced from 19 per 1000 inhabitants in the year 1965 to 11 per 1000 inhabitants in the year 1985. That corresponds to a decrease around 44 % ... In the year 1993 the migrations between nowadays 16 Länder reached 12 per 1000 inhabitants and thus around 34 % less than 1965. Meanwhile the internal migration rates for reunited Germany adapt themselves to the level of the earlier federal territory in the middle of the 80's." (Flöthmann 1996: 72)

2 Modelling migration

2.1 Circumstances of long distance migrations

It is a common view in migrations theory that migrations are explained by rational choice arguments. These can be others for migrations at a long distance than for migration within a municipality:

"The generally higher information and search costs and missing networks put the assumption close that for landspreading residence changes rather essential decisions are causal in the individual life cycle. Such 'essentials' can be added to the protection of a vocational base formation, to the household and establishment of family, vocational options or serious family events. On the other hand, housinginduced mobility decisions as adjustment of the dwelling size, of the living costs etc to changed family and household requirements or the implementation of individual living conceptions quite predominantly are realised by mobility within the borders of the Länder." (Hinrichs 1997: 380; cf. Herlyn 1990: 30-31; Holtmann, Schaefer 1996: 150)

The conditions of remote migrations are to be examined with the help of event history analysis. This method is known in the migration demography since at least one and a half decade (da Vanzo 1982/1993), its poor

application probably is due to the rareness of longitudinal data. Analyses of the migration in the life course panel of the Max-Planck-Institut for Educational Research (*Wagner 1989*) or the connection of macro and micro models of migration (*Birg, Flöthmann, Heins, Reiter 1991*) are exceptions in the German speaking countries.

With the event history analysis the influence is calculated by arguments A on the probability that a status B changes:

$$\Delta Y_t^A \rightarrow \Delta \Pr(\Delta Y_{t'}^B) \quad t < t' \quad (1)$$

An unknown quantity proportion of the population at risk might have the questionable event after the point in time of a data acquisition. These censored data are taken into account with suitable methods. If the independent variables are time variant, the whole sojourn time ΔY^B must be split accordingly.

2.2 Junctions of events

The event history analysis is based on the Markovian assumption that stochastic processes are unambiguously determined by the initial distribution and the transition matrix. Serious methodological problems result from the fact that biographic events not can be represented as Markov chain or as parts of a staging process. This problem is a far research field. Bernoulli probably referred as the first to competing risks. His description of deaths by plague and other diseases dealt with an absorbing event with a clear causality of morbidity and mortality. In a broader view parallel processes (cf. Blossfeld et al. 1996), simultaneous or conjunct events (Hullen 1995) are discussed. Courgeau and Lelièvre prefer the terminus of interfering events (Courgeau, Lelièvre 1997).

Modelling sojourn times Blossfeld et al. (1996) distinct between a systematic approach and a dynamic approach. They prefer the latter one:

"In the context of the so-called systematic approach (cf. Tuma, Hannan 1984; Courgeau, Lelièvre 1992) the interdependent components of the process are combined and the changes of the dynamic system as a whole are newly defined as 'dependent variable'. The focus of the analysis can be thereby not on the dependence of the process' components among themselves, but shifts on the level of the modification of the total system. The interdependencies between the different subprocesses of more complex models can be considered therefore only implicitly." (Blossfeld et al. 1996, S. 31)

The dynamic causal approach is described as follows:

"On the base of the question to be investigated and following preliminary theoretical considerations one of the process components in general is declared as the dependent process whose course is to be described and explained. On this way it has to be taken into account that changes in the process can be dependent as of the process' history as of other parallel processes. Corresponding to this the system of shared processes is not used as dependent variable but the previous course and the recent status of the system as a whole are seen as condition of all future changes of the process' single parts." (Blossfeld et al. 1996: 32, with further citation of Blossfeld, Rohwer 1995a; 1995b; Blossfeld 1986; Gardner, Griffin 1986; Blossfeld, Huinink 1991)

Using the dynamic causal approach Blossfeld et al. (1996) demonstrated that the stadium of a pregnancy and the age of a child are determinants of the timing of marriages. Thus the approach has been proven for the analysis of dependencies between two biographies. But it seems that the causal approach does not fit to the analysis of internal migration. The interrelation between biographic events like marriage, birth or dissolution with the decision to move across state boundaries probably cannot be declared as causalities. The timing of migration and other biographies is neither logically determined nor by causality nor by social norms.

As example we think of the surely frequent case that one partner of a consensual union starts working in another state, takes an provisional flat there, looks for a flat to be shared with the partner and moves into this flat. A time of fluctuating living in more than one flat at the old and the new place may be followed by the common removal, a marriage, and the birth of a child. The sequence of this example can be imagined also in a

reversed order: The expectation of a child is followed by a marriage at the old place, after that by the search for a new flat and a removal across state borders.

In the case of migration without no doubt also a reversed order of variables is possible:

$$\Delta Y_{t'}^B \rightarrow \Delta \Pr(\Delta Y_{t''}^A) \quad t' < t'' \quad (2)$$

The uncertainty about the interrelations in the migration complex A°B is at argument in favour of the systematic approach which defines the changes of the system as a whole. This does not exclude to analyse the influence of preceding events C:

$$\Delta Y_t^C \rightarrow \Delta \Pr(\Delta Y_{t'}^A \clubsuit \Delta Y_{t'}^B) \quad t < t' \quad (3)$$

Our attempt is to use the systemic approach. Furthermore we try to make a distinction between changes of variables which are conjunct and changes which really might have an influence on the migration. Therefore it is proposed to include only those status changes of presumably independent variables in the initial distribution which took place in a specified time Δt before the migration:

$$\Delta Y_{t-\Delta t}^C \rightarrow \Delta \Pr(\Delta Y_{t'}^A \clubsuit \Delta Y_{t'}^B) \quad t < t' \quad (4) \text{ and also}$$

$$\Delta Y_{t-\Delta t}^C \rightarrow \Delta \Pr(\Delta Y_{t'}^A) \quad t < t' \quad (5)$$

In principle it does not matter if the event is conjunct or not (5). The general difficulty will be to find grounded assumptions for the amount of Δt , i.e. for the fuzzy part of the sojourn time.

3 Empirical Basis

The German Family and Fertility Survey (FFS) has been conducted in 1992 with ten thousand respondents, i.e. about 3000 women and 2000 men each in the western and the eastern part of Germany. They were between 20 and 39 years old. The questions concerned the respondents' previous partnership relations, children, professions, removals, their intention to have children, and attitudes towards parenthood (Pohl 1995, Hullen 1998).

The former German Democratic Republic is not included in this analysis. In the GDR flats have been administrated by the government. There was scarcity of flats, and removals took place under other circumstances than in Western Germany. The huge refuge from East to West has had special reasons. After the "Wende" the mobility of East Germans has converged to West German levels (cf. Hinrichs 1997); the Family and Fertility Survey however does not give information to this development because it was performed already 1992.

4 Results

4.1 Frequency of moves

As expected older respondents, if ever, have moved more frequently than younger (table 1). More than nine tenth of the 20 to 24 years old and more than four fifth of the 35 to 39 years old still lived in the state of their childhood. Most of the moves had taken place in the age until 25 years, i.e. in the age of youth and young adults. Women in younger ages had moved a little more frequent. The gender difference however is not significant in the cross-sectional view. - It has to be added that FFS statements about mobility are restricted to the age until 39 years, according to the age of the respondents.

Table 1: Moves until 1992 by age groups, West German sample (percentages)

Age group	35-39	30-34	25-29	20-24	Total
All respondents					

No move	84	87	86	92	87
One or more move(s)	16	13	14	8	13
Total (N = 4958)	22	25	28	25	100
<i>Women</i>					
No move	85	87	85	92	87
One or more move(s)	15	13	15	8	13
Female sample (N = 2983)	23	25	27	25	100

Source: Family and Fertility Survey, 1992; BiB II 5/FFS741

4.2 Junctions with other biographic events

Table 2: Junctions of moves with other biographical events within different time intervals, West German sample (percentages)

Junctions of moves within ... / with ...	same month	3 months	5 months	7 months	9 months
<i>All respondents</i>					
End of education	3	5	7	8	9
End of former profession	4	5	6	7	7
Begin of new profession	7	10	11	12	12
Begin of cohabitation	11	12	13	14	14
Marriage	3	3	4	4	4
Dissolution of union	1	1	1	2	2
Moves total (N = 857)	100	100	100	100	100
<i>Women</i>					
End of education	4	6	8	8	10
End of former profession	4	5	7	8	8
Begin of new profession	6	8	9	9	10
Begin of cohabitation	11	13	14	14	15
Marriage	3	4	5	5	5
Dissolution of union	1	1	1	2	2
Moves female sample (N = 531)	100	100	100	100	100

Source: Family and Fertility Survey, 1992; BiB II 5/FFS741

In table 2 the percentages of junctions of moves with some other biographic events are shown, namely with the end of education, the end and the begin of a new profession, the begin of a joint household with a partner, with a marriage, and with a dissolution of partnerships. As mentioned before migration theory maintains that decisions to migrate might be dependent on changes of education, career, or on changes in families and partnerships. Theoretically it is possible to include some more biographic events, for instance births and pregnancies, or school changes of the respondents' children. But it would become more and more difficult to explain how these were related to a move.

These other biographical changes could have taken place in a longer time interval surrounding the move. Therefore the columns of table 2 are differentiated by time intervals - if the events had taken place in the same month as the move or in time intervals of one, two, three or four months before and after the move. So the whole time intervals have a duration of one to nine months.

37 per cent of the respondents' moves were conjunct with these other biographic changes in the whole interval of four months before and after the move. This seems to be a small amount in respect to the assumptions of rationale mobility motives which stem from changes in other life spheres. About two thirds of the FFS respondents did not fit these assumptions - at least not in an appropriate time and within the age groups of the survey.

Especially the small amount of moves which are conjunct with the educational or professional career is amazing. In the literature it is assumed that moves of youths and young adults are induced by changes of schools and universities or by changes of the employment (Gatzweiler 1975). It has to be taken into consideration that the respondents were asked for the end of their educational career, not for its stages. The aim of questions to the career biography had been to register changes of professions and to new fields of profession,

not changes only of the employer or of the place of the job.¹ The consequence might be an underestimation of job related moves.

As can be seen in table 2 less than ten per cent of the moves of the 20 to 39 years old were conjunct with the end of their educational biography. About the same number of moves were coincident with the end of a profession. Not in all cases the end of the education and the end of a job were followed by the begin of a new profession, in the female sample to a smaller amount than in the male sample. This is obviously the only gender difference and can be explained by the lower employment participation of women in West Germany.

About ten per cent of moves across state boundaries coincide exactly with moves with the partner in a joint household.² In the interval of nine months (plus / minus four months about the month of the migration) this portion grows to about fifteen per cent. A part of these moves have been related to marriages. It is clear that there were also some migrations which were conjunct with the end of partnerships.

4.3 Fuzziness

The question is which might be an appropriate interval to declare conjunct events? As expected that the percentages of junctions increases with the duration of the intervals (table 2). For instance junctions of moves with ends of professions go up from four to seven per cent in the whole sample and even to ten per cent in the female sample. It would give no sense not to be aware of fuzzy time in sequences of events which are not causal related and to restrict junctions to the same month only. On the other hand the definition of longer intervals could inhibit the neglect of short-time changes for instance of consensual unions or of professions.

4.4 Event history analysis

In our investigation the initial distribution as usually, conforming to regression analysis, was modelled by different sets of independent variables. In a second attempt which only will be shown here initial distributions were modelled which in different manner took account of the last changes of the independent variables.

The variable set is listed in table 3. It should be noticed that the value of the variables is determined by the state at the beginning of the sojourn times, not by the value at time of the migration resp. at the time of censoring. The waiting time whose first beginning was fixed at age 15 has been splitted according to the changes of age, partnerships, children and profession status. The respondents educational career could not be included in the same way, because there have been only questions for the end of education and the highest educational degree. The latter was taken as a proxy for "educational aspiration" assuming that it has been relatively constant in the life course. The splits were censored if they did not end with the migration or the time of interview.

Table 3: Variables of the event history analysis and their values

Variable	Values
Women	<0> no (= male, reference) <1> yes, female
Cohort	<1> 35-39 y. <2> 30-34 y. <3> 25-29 y. <4> 20-24 y.
Educational aspiration	Educational attainment (ISCED) <2> secondary level 1 <3> secondary level 1 with vocational education <4> tertiary level, vocational <5> tertiary level, graduate

¹ The respondents were asked to indicate their jobs on a list, containing 28 profession groups in ten areas, following the International Standard Classification of Occupations (ISCO): (0) armed forces, (1) executive personnel (2) scientists etc (3) technicians and commensurate non-technical occupations (4) office personnel and commercial employees (5) service occupations and specialist sales personnel (6) skilled agricultural personnel etc (7) manual trades and related occupations (8) equipment and machine operators and assemblers (9) unskilled or semi-skilled personnel. In the survey instruction the respondents were informed: "In this context it is not important whether you worked in the same occupation/job for different employers - this will count here as the same job. Of interest here is whether you changed to another occupation/job or if you quit the job once and for all or for a certain period of time."

² The question has been "In what month and year did you first start living with your (first, second, ...) partner in a joint household?" [In welchem Monat und Jahr sind Sie (zum ersten/nächsten Mal) mit Ihrem (ersten/nächsten) Partner in eine gemeinsame Wohnung gezogen?]

Education end	<0> no (reference) <1> yes
Age under 20	<0> no (reference) <1> yes
Age 20-24	<0> no (reference) <1> yes
Consensual union	Living with a partner in a shared household <0> no (reference) <1> yes
Married	<0> no (reference) <1> yes
Children	Number of children
Unemployed	<0> no (reference) <1> yes

The hazard function was modelled as an exponential function. Possibly some other functions are more appropriate to migration biography and especially the program TDA (Rohwer 1993) which was used offers a broader range of them. On behalf of the priority to estimate the effects of selected variables and not to calculate the hazard rate itself the more robust exponential function was preferred.

Table 4: Event history analyses of migration, West Germany, with interval of zero months (model 1) resp. four months (model 2) between the last foregone change of the independent variables and the end of the sojourn time

Destination	Variable	Model 1		Model 2	
		β	exp(β)	β	exp(β)
Migration	Constant	-6,89 ***	,00	-7,02 ***	,00
	Women	,32 ***	1,37	,33 ***	1,40
	Cohort	-,12 ***	,89	-,14 ***	,87
	Educational aspiration	,10 ***	1,11	,10 ***	1,10
	Education end	-,20 *	,81	-,07	,93
	Age under 20	-,19 *	,82	,01	1,01
	Age 20-24	,38 ***	1,46	,51 ***	1,66
	Consensual union	,27 *	1,31	-,01	,99
	Married	-,14	,87	-,15	,86
	Children	-1,11 ***	,33	-1,08 ***	,34
	Unemployed	,68 ***	1,97	,37 **	1,44
	N events		857		857
N cases		5575		5575	
Person years		935029		935029	
LL start		-6784		-6785	
LL final		-6458		-6459	

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Family and Fertility Survey, 1992; BiB II 5/FFS742

The model 1 as usual is intent on an initial distribution which is the acute status before the event took place resp. before the data of censoring. The selected variables are shown with their beta coefficients, their significance level and their antilogs. The latter describe the change of the hazard rate.

The results in shorthand:

- Women moved more frequently or earlier than men,
- Persons with higher educational aspiration more frequently
- The migration propensity of the 20 to 24 years held the maximum
- Partners of consensual unions moved more frequently
- Unemployed persons moved more frequently than employed

On the other hand the migration propensity was smaller

- In the younger age groups
- After the end of education
- Of married persons
- Of persons with children.

These effects can be described as percentages of changes of the hazard rate. For instance the migration propensity of women has been 37 per cent higher than that of men ($\exp(\beta) = 1.37$). With each child it decreased by two third ($\exp(\beta) = 0.33$). - At the bottom of the table the number of events, of records and the sum of sojourn times (person years) is indicated. The log likelihood values show that model 1 fits the empirical data better than a model without any independent variable would do.

If one would like to do so one could hold these results for true and look for reasonable interpretations. Instead of this another model shall be presented here. The second model pays attention to the fact that removal data and data of other biographic events which often lie together within a fuzzy time do not comply the markovian assumption. Therefore only those changes of other biographical data are taken into account which precede the data of the event or of censoring by a certain time interval. In this case this interval was set to four months. This may be rather long as discussed above because changes within shorter intervals might be neglected, but this decision was made to clarify the approaches.

In model 2 some variables "lose their significance". There is no longer a significant affect of

- Education end,
- Age under 20,
- Consensual union

and only a smaller significance for

- Unemployed.

The remaining significant effects of the model 2 can be explained without any difficulty. Furthermore the "losses" of significance give some insight in the whole migration process: The end of education and the begin of a consensual union are obviously not preceding but conjunct to migration. Therefore it is no longer necessary to reflect if there is any causal relation between these events. Unemployed persons still have a higher migration propensity but on a lower level of significance than in model 1, in other words, the model 2 shows that also changes to unemployment might be coincident with migrations.

5 Discussion

It has been shown that internal moves in Germany are related to changes in educational, professional or private biography to a smaller degree as could be expected. The assumption of migration decisions depending on changes in these other spheres could not be sustained.

Searching explanatory variables for migration propensity it is necessary to make a distinction between events which precede migration decisions and others which are conjunct to the moves. Because there are no causal relations between events in the educational, professional or private sphere to migration, event history analysis of migration should model sojourn times by taking account only of those changes of independent variables which really have preceded.

6 Literature

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